

ATTACHMENT 13

INSTRUMENT CALIBRATION

Attachment 13
Instrument Calibration

The attached table lists each instrument by its tag number, the parameter that it monitors, the type of instrument it is, the manufacturer, model number, and the minimum required frequency of calibration. In all cases, the minimum frequency of calibration will be at least that recommended by the manufacturer.

Each instrument will be calibrated according to the procedures recommended by the manufacturer. These written procedures will be maintained on-site. Each calibration will be documented on log sheets. Each log sheet will clearly identify the instrument being calibrated, the date of calibration and the signature of the person performing the calibration. It will include the settings/readings prior to any adjustments, any adjustments made to the instrument, and any other information recommended to be checked by the manufacturer for that particular instrument. Any unusual findings discovered as part of the calibration will also be noted on the calibration logs. If any problems need to be corrected or any repairs made to the instrument, a work order will be generated.

A separate maintenance file will be maintained for each instrument/monitor. The file shall contain all work, maintenance, calibration, testing, and inspection data as required for each instrument.

As part of the calibration of the tank level instruments, a check of the interlocks will also be performed. To perform the interlock checks, a signal representative of the level transmitter's output will be generated into the system. After the alarm threshold has been crossed, the interlocks should activate. If the proper response is not observed, work orders will be generated to correct all problems.

A check of the accuracy of the tank levels will also be performed as part of the calibration by comparing a manual measurement of the tank (stick the tank) to that indicated by the level instrument. These values will also be noted on the calibration logs.

The calibration of the high-high level switches on the tanks is actually a verification of their operability. With the automatic inlet valve to the tank manually isolated and opened, the level switch will be manually activated to prove mechanical operability of the level switch. If the proper response is not observed, work orders will be generated to correct all problems.

INSTRUMENT CALIBRATION SCHEDULE

| TAG # | SYSTEM PARAMETER MEASURED | MONITOR TYPE | MANUFACTURER | MODEL NUMBER | REQUIRED CALIBRATION FREQUENCY |
|----------|--------------------------------|-----------------------------------|-----------------------------|----------------|--------------------------------|
| AT2104A | 1st stage inlet pH | pH analyzer | Johnson Yokogawa or Quantum | pH 400 or Q45P | quarterly |
| AT2104B | 1st stage inlet pH | pH analyzer | Johnson Yokogawa or Quantum | pH 400 or Q45P | quarterly |
| AT2129A | 2nd stage rundown pH | pH analyzer | Johnson Yokogawa or Quantum | pH 400 or Q45P | quarterly |
| AT2129B | 2nd stage rundown pH | pH analyzer | Johnson Yokogawa or Quantum | pH 400 or Q45P | quarterly |
| AT2130A | 2nd stage inlet pH | pH analyzer | Johnson Yokogawa or Quantum | pH 400 or Q45P | quarterly |
| AT2130B | 2nd stage inlet pH | pH analyzer | Johnson Yokogawa or Quantum | pH 400 or Q45P | quarterly |
| AT2199A | stack CO -- CEM A (low) | nondispersive infrared photometry | Westinghouse Maihak | UNOR 6N | daily (see Attachment 15) |
| AT2199B | stack CO -- CEM A (high) | nondispersive infrared photometry | Westinghouse Maihak | UNOR 6N | daily (see Attachment 15) |
| AT2199C | stack CO -- CEM B | nondispersive infrared photometry | Maihak | UNOR 6N | daily (see Attachment 15) |
| AT2200A | stack O ₂ -- CEM A | paramagnetic | Servomex | 4900 | daily (see Attachment 15) |
| AT2200B | stack O ₂ -- CEM B | paramagnetic | Servomex | 4900 | daily (see Attachment 15) |
| AT1010A | ABC O ₂ -- unit A | zirconia oxygen analyzer | Johnson-Yokogawa | ZA-8 | monthly |
| AT1010B | ABC O ₂ -- unit B | zirconia oxygen analyzer | Johnson-Yokogawa | ZA-8 | monthly |
| AT2020B | baghouse broken bag | optical particle counter | BHA | CPM-750 | monthly |
| AIT4016 | bulk solids vent LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4017 | shredder vent LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4018A | kiln comb. air LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4018B | kiln comb. air LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4018C | north ABC comb. air LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4018D | south ABC comb. air LEL | diffusion | Gastech | 61-101 | monthly |
| AIT1020 | A damper LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4051 | T-403 vent LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4023 | sludge T-406 vent LEL | diffusion | Gastech | 61-101 | monthly |
| AT1122 | cylinder station LEL | diffusion | Gastech | 61-101 | monthly |
| AT3013 | drum direct burn glove box LEL | diffusion | Gastech | 61-101 | monthly |

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|---------|---|--------------------------|------------------------------------|-------------------------|--------------------------------|
| AIT4019 | sludge pit O ₂ | diffusion | Gastech | 65-1040-9245 | monthly |
| AIT4052 | sludge pit LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4012 | repack room O ₂ | diffusion | Gastech | 65-1040-9245 | monthly |
| AIT4013 | repack room LEL | diffusion | Gastech | 61-101 | monthly |
| AIT4014 | decant room O ₂ | diffusion | Gastech | 65-1040-9245 | monthly |
| AIT4015 | decant room LEL | diffusion | Gastech | 61-101 | monthly |
| AIT3044 | hydrocarbon vent O ₂ | sample draw | Gastech | Safe T Net 100 | monthly |
| AIT4055 | decant vacuum pump O ₂ | sample draw | Gastech | Safe T Net 100 | monthly |
| AIT4073 | E-7 LEL | diffusion | Gastech | 61-101 | monthly |
| FT2066A | Carbon Injection Train 1 Air Flow Rate | Orifice Plate / dP Cell | Viatran | IDP10 | annual |
| FT2066B | Carbon Injection Train 3 Air Flow Rate | Orifice Plate / dP Cell | Viatran | IDP10 | annual |
| WT2037A | Carbon Injection Train 1 Carbon Feed Rate | load cells | Thermo Ramsey | Loadcell, 150KG, #41023 | quarterly |
| WT2037B | Carbon Injection Train 3 Carbon Feed Rate | load cells | Thermo Ramsey | Loadcell, 150KG, #41023 | quarterly |
| FT1121 | kiln blend flow rate | coriolis mass flow meter | Micro Motion | DS1005128SU | monthly |
| FT1131 | kiln fuel oil flow rate | turbine flow meter | FMSI Flow Measurement Systems Inc. | PC100KA1BXO | annual |
| FT1151 | kiln aqueous flow rate | coriolis mass flow meter | Micro Motion | DS1005128SU | monthly |
| FT1184 | ABC north blend flow rate | coriolis mass flow meter | Micro Motion | DS1005128SU | monthly |
| FT1194 | ABC north fuel oil flow rate | turbine flow meter | FMSI Flow Measurement Systems Inc. | PC100KA1BXO | annual |
| FT1221 | ABC south blend flow rate | coriolis mass flow meter | Micro Motion | DS1005128SU | monthly |
| FT1231 | ABC south fuel oil flow rate | turbine flow meter | FMSI Flow Measurement Systems Inc. | PC100KA1BXO | annual |
| FT1253 | ABC north aqueous flow rate | coriolis mass flow meter | Micro Motion | DS1005128SU | monthly |
| FT1263 | ABC south aqueous flow rate | coriolis mass flow meter | Micro Motion | DS1005128SU | monthly |
| FT3018 | drum direct burn flow rate | coriolis mass flow meter | Endress Hauser | Pro Mass 63 | monthly |
| FT4042 | sludge flow rate | coriolis mass flow meter | Endress Hauser | Pro Mass 63 I | monthly |
| WT1035 | flop gates weigh cells | load links | Mettler Toledo | JAGXTREME | quarterly |
| WT1102A | cylinder weight | load cells | Rice Lake | HP33-1K | monthly |
| WT1102B | lecture bottle weight | load cells | Rice Lake | BM1818-300 | monthly |
| N/A | E-1 drum scales | load cells | Fairbanks | | annual |

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|---------|---------------------------------|--|--------------------------------|-------------------------|--------------------------------|
| N/A | E-5 drum scales | load cells | Fairbanks | | annual |
| N/A | main truck scales | load cells | Fairbanks | | annual |
| FT1171 | direct burn flow rate | coriolis mass flow meter | Endress Hauser | Pro Mass 63 I | monthly |
| FT2081A | saturator flow rate | magnetic flow converter | Yokogawa | AE14 Mag Flow Converter | quarterly |
| FT2081B | saturator flow rate | magnetic flow converter | Yokogawa | AE14 Mag Flow Converter | quarterly |
| FT2092A | 1st stage flow rate | magnetic flow converter | Yokogawa | AE14 Mag Flow Converter | quarterly |
| FT2092B | 1st stage flow rate | magnetic flow converter | Yokogawa | AE14 Mag Flow Converter | quarterly |
| FT2095A | 2nd stage flow rate | magnetic flow converter | Yokogawa | AE14 Mag Flow Converter | quarterly |
| FT2095B | 2nd stage flow rate | magnetic flow converter | Yokogawa | AE14 Mag Flow Converter | quarterly |
| FT2195 | stack flow rate | annubar (Δp converted to flow rate) | Bailey | PTDDB121200A000 | annual |
| FIT1143 | kiln primary air flow rate | annubar (Δp converted to flow rate) | Rosemount | 3051CD1A22A1AB4 0-25" | annual |
| FIT1192 | north ABC primary air flow rate | annubar (Δp converted to flow rate) | Rosemount | 3051CD1A22A1AB4 0-25" | annual |
| FIT1247 | south ABC primary air flow rate | annubar (Δp converted to flow rate) | Rosemount | 3051CD1A22A1AB4 0-25" | annual |
| FIT1015 | secondary air flow rate | annubar (Δp converted to flow rate) | Rosemount | 3051CD1A22A1AB4 0-25" | annual |
| FS4097 | bulk solids vent flow | flow switch | Fluid Components International | FLT93S-1A1A106C1A00000 | annual |
| FT2201 | CEM sample flow rate | turbine flowmeter | Omega | FMA-5610-ST | annual |
| LT3108 | tank T301 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3118 | tank T302 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3128 | tank T303 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3138 | tank T304 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3148 | tank T305 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3158 | tank T306 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3168 | tank T307 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3178 | tank T308 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3188 | tank T309 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3198 | tank T310 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |

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|----------|---------------------------|------------------------------|-----------------------------|---|--------------------------------|
| LT3208 | tank T311 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3218 | tank T312 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3278 | tank T321 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3288 | tank T322 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3258 | tank T323 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT3268 | tank T324 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LT4023 | tank T406 level | ultrasonic level transmitter | Hawk | Range Master Ultrasonic Level Transmitter | quarterly |
| LT4030 | tank T401 level | microwave level transmitter | CannonBear or Saabrosemount | 1001/1220 or RTG40 | quarterly |
| LS3112 | tank T301 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3122 | tank T302 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3132 | tank T303 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3142 | tank T304 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3152 | tank T305 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3162 | tank T306 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3172 | tank T307 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3182 | tank T308 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3192 | tank T309 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3202 | tank T310 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3212 | tank T311 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3222 | tank T312 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3282 | tank T321 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3292 | tank T322 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3262 | tank T323 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS3272 | tank T324 high level | float switch | Level Control Switch | LCS-M100SB | quarterly |
| LS4031 | tank T401 high level | level switch | Delta Mode 1 | 104-A-0-N78-1-14"-2" RF flg | quarterly |
| PIT1006A | combustion pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PIT1006B | combustion pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PIT1006C | combustion pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PIT2020A | baghouse inlet pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PIT2020B | baghouse outlet pressure | pressure transmitter | Rosemount | 1151DP3 | annual |

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|----------|---|----------------------|-----------------------------------|--------------------|--------------------------------|
| PT2044 | spray dryer top nozzle pressure | pressure transmitter | Rosemount | 114G1200 | annual |
| PT2045 | spray dryer bottom nozzle pressure | pressure transmitter | Rosemount | 114G1200 | annual |
| PIT2093A | scrubber inlet pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PIT2093B | scrubber outlet pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PIT2093C | scrubber middle pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PT1018 | kiln combustion air pressure | pressure transmitter | Rosemount | 1151DP3 | annual |
| PSL1119A | kiln blend pressure switch | pressure switch | SOR Static O'Ring Control Devices | 44V1-K5-N1-C1A | annual |
| PDSL1124 | kiln atomizing air / blend Δp switch | pressure switch | Ashcroft | LDDN4GGB25 | annual |
| PSL1119B | north ABC blend pressure switch | pressure switch | SOR Static O'Ring Control Devices | 44V1-K5-N1-C1A | annual |
| PSL1156 | kiln aqueous atomizing air switch | pressure switch | SOR Static O'Ring Control Devices | 6NN-K5-N4-F1A-RR | annual |
| PSL1157 | kiln aqueous pressure switch | pressure switch | SOR Static O'Ring Control Devices | 4NN-K4-N4-C1A | annual |
| PDSL1187 | north ABC atomizing air / blend Δp switch | pressure switch | Ashcroft | LDDN4GGB25 | annual |
| PSL1196 | south ABC blend pressure switch | pressure switch | SOR Static O'Ring Control Devices | 44V1-K5-N1-C1A | annual |
| PDSL1224 | south ABC atomizing air / blend Δp switch | pressure switch | Ashcroft | LDDN4GGB25 | annual |
| PSL1162 | direct burn atomizing air pressure switch | pressure switch | SOR Static O'Ring Control Devices | 6NN-K5-N1-F1A-RR | annual |
| PSL1165B | north ABC aqueous pressure switch | pressure switch | SOR Static O'Ring Control Devices | 6NN-K5-N4-F1A-RR | annual |
| PSL1256 | north ABC aqueous atomizing air switch | pressure switch | SOR Static O'Ring Control Devices | 6NN-K5-N4-F1A-RR | annual |
| PSL1165C | south ABC aqueous pressure switch | pressure switch | SOR Static O'Ring Control Devices | 6NN-K5-N1-F1A-RR | annual |
| PSL1266 | south ABC aqueous atomizing air switch | pressure switch | SOR Static O'Ring Control Devices | 6NN-K5-N1-F1A-RR | annual |
| PSL1107 | cylinder eductor N ₂ pressure | pressure switch | SOR Static O'Ring Control Devices | 6NN-K5-N4-F1A-RR | annual |
| PSL1206 | glove box eductor N ₂ pressure | pressure switch | SOR Static O'Ring Control Devices | 6NN-K2-N1-F1A-RR | annual |
| ST1003 | kiln speed | speed | Electro Sensor | SSA-50C ser# 37833 | annual |
| TT1005A | kiln temperature | infrared pyrometer | E ² Technology Corp. | Pulsar II | annual |
| TT1005B | kiln temperature | infrared pyrometer | E ² Technology Corp. | Pulsar II | annual |

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|---------|---------------------------|---------------------------------------|--------------|---------------------|--------------------------------|
| TT1009A | ABC temperature | temp transmitter/ type K thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT1009B | ABC temperature | temp transmitter/Type K thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT1009C | ABC temperature | temp transmitter/Type K thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT2001A | spray dryer temp | temp transmitter/Type J thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT2001B | spray dryer temp | temp transmitter/Type J thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT2001C | spray dryer temp | temp transmitter/Type J thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT2082A | saturator temp | temp transmitter/Type J thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT2082B | saturator temp | temp transmitter/Type J thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT2082C | saturator temp | temp transmitter/Type J thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |
| TT2194 | stack temperature | temp transmitter/Type J thermocouple | Accutech | AI-2000 W/XP-HDC2-L | annual |